CS 327E Class 7

March 9, 2020

1) Which is not an aggregate function?

A. SUM()
B. COUNT()
C. AVG()
D. MIN()
E. UPPER()

2) What is the output from Q1 when run on the table shown?

```
Q1: SELECT COUNT(*) FROM Harlem_Globetrotters
    WHERE pos IN ('G', 'F')
```

Harlem_Globetrotters

no	name	height	pos	school
1	Lili "Champ" Thompson	1.75	G	Notre Dame State
2	Carlis "Dizzy" English	1.70	G	Cleveland State
3	Tay "Firefly" Fisher	1.75	G	Siena
6	Brianna "Hoops" Green	1.75	G	UT - El Paso
31	Donte "Hammer" Harrison	2.06	F	Hampton
15	Brittany "Ice" Hrynko	1.85	G	Montana

A. 1
B. 5
C. 6
D. 0

3) What is the output from Q2 when run on the table shown?

```
Q2: SELECT MAX(height) FROM Harlem_Globetrotters
    WHERE pos = 'G'
```

Harlem_Globetrotters

no	name	height	pos	school
1	Lili "Champ" Thompson	1.75	G	Notre Dame State
2	Carlis "Dizzy" English	1.70	G	Cleveland State
3	Tay "Firefly" Fisher	1.75	G	Siena
6	Brianna "Hoops" Green	1.75	G	UT - El Paso
31	Donte "Hammer" Harrison	2.06	F	Hampton
15	Brittany "Ice" Hrynko	1.85	G	Montana

A. 1.75
B. 1.85
C. 2.06

4) What is the output from Q3 when run on the table shown?

```
Q3: SELECT SUM(height) FROM Harlem_Globetrotters
    WHERE pos = 'F'
```

Harlem_Globetrotters

no	name	height	pos	school
1	Lili "Champ" Thompson	1.75	G	Notre Dame State
2	Carlis "Dizzy" English	1.70	G	Cleveland State
3	Tay "Firefly" Fisher	1.75	G	Siena
6	Brianna "Hoops" Green	1.75	G	UT - El Paso
31	Donte "Hammer" Harrison	2.06	F	Hampton
15	Brittany "Ice" Hrynko	1.85	G	Montana

A. 1.75
B. 1.85
C. 2.06

5) What is the output from Q4 when run on the table shown?

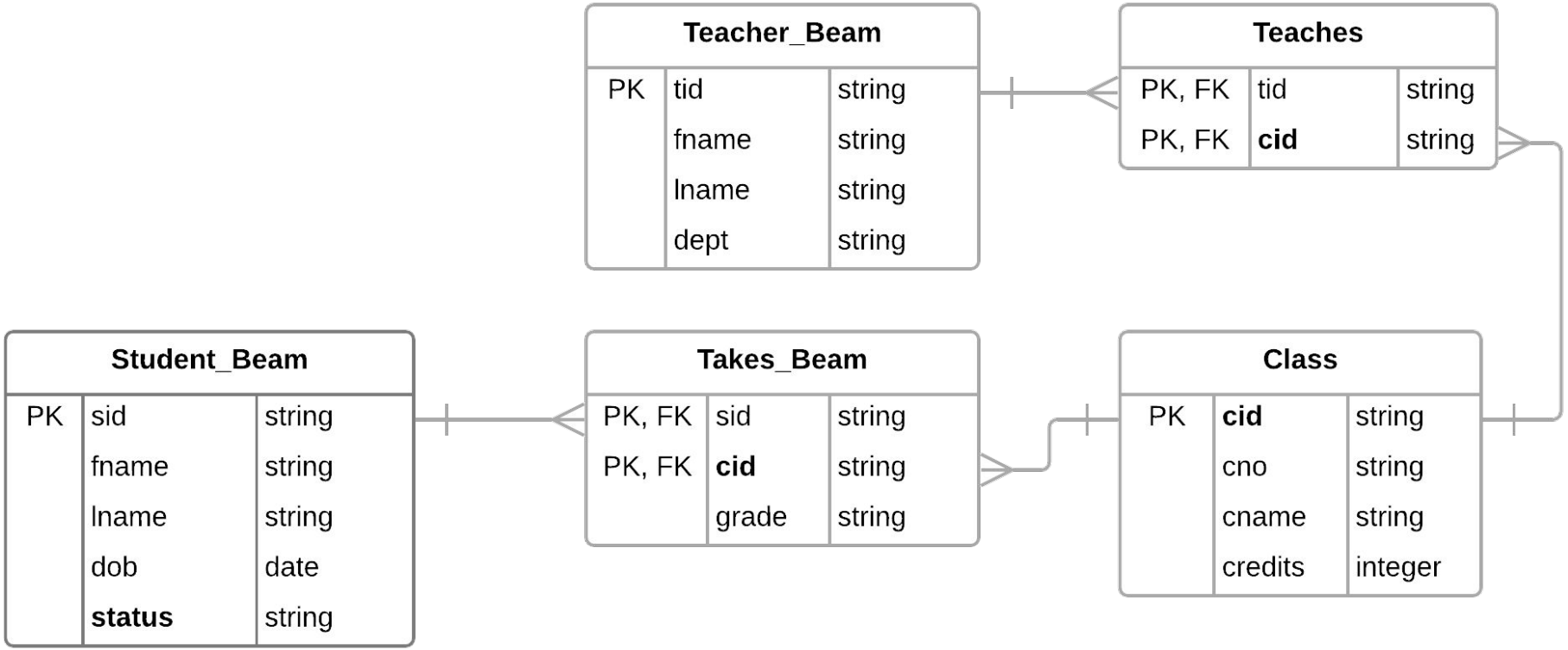
```
Q4: SELECT COUNT(DISTINCT height) FROM Harlem_Globetrotters
    WHERE pos NOT IN ('F', 'G')
```

Harlem_Globetrotters

no	name	height	pos	school
1	Lili "Champ" Thompson	1.75	G	Notre Dame State
2	Carlis "Dizzy" English	1.70	G	Cleveland State
3	Tay "Firefly" Fisher	1.75	G	Siena
6	Brianna "Hoops" Green	1.75	G	UT - El Paso
31	Donte "Hammer" Harrison	2.06	F	Hampton
15	Brittany "Ice" Hrynko	1.85	G	Montana

A. 0
B. 1
C. 3
D. 4

Latest College ERD

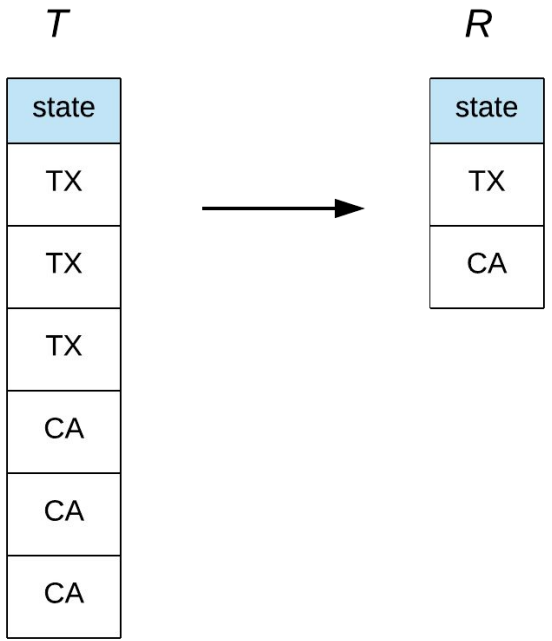


Syntax of Global Aggregate Queries

```
SELECT <aggregate function>[, <aggregate function>]
FROM <single table>
[JOIN <single table> ON <join condition>]
[WHERE <boolean condition>]
ORDER BY <field(s) to sort on>
```

Syntax of Group By Queries

```
SELECT <unaggregated field(s)>
FROM <single table>
[JOIN <single table>
ON <join condition>]
[WHERE <boolean condition>]
GROUP BY <unaggregated field(s)>
```



First Question

What are the years of birth and status of all students?

Student_Beam(sid, fname, lname, dob, status)

Class(cid, cno, cname, credits)

Teacher_Beam(tid, fname, lname, dept)

Takes_Beam(sid, cid, grade)

Teaches(tid, cid)

Syntax of Aggregate Queries with Groups

```
SELECT <unaggregated field(s)>, <aggregate function(s)>
FROM <single table>
[JOIN <single table> ON <join condition>]
[WHERE <boolean condition>]
GROUP BY <unaggregated field(s)>
[HAVING <boolean condition>]
[ORDER BY <field(s) to sort on>]
```

How COUNT() works

1)
```
SELECT COUNT(*)
FROM Employee
```

2)
```
SELECT COUNT(emp_dept)
FROM Employee
```

3)
```
SELECT COUNT(DISTINCT emp_dept)
FROM Employee
```

Employee

Row	empid	emp_name	emp_dept
1	6	Sunil	1
2	2	Mike	1
3	23	Dave	2
4	5	Jim	4
5	37	Morgan	4
6	3	Sarah	*null*

Second Question

How many students are taking each class?

Student_Beam(sid, fname, lname, dob, status)

Class(cid, cno, cname, credits)

Teacher_Beam(tid, fname, lname, dept)

Takes_Beam(sid, cid, grade)

Teaches(tid, cid)

Third Question

For each class with at least two students,
how many students are taking such a class?

Student_Beam(sid, fname, lname, dob, status)
Class(cid, cno, cname, credits)
Teacher_Beam(tid, fname, lname, dept)
Takes_Beam(sid, cid, grade)
Teaches(tid, cid)

iClicker Question

For each class with at least two students, how many students are taking such a class?

Student_Beam(sid, fname, lname, dob, status)

Class(cid, cno, cname, credits)

Teacher_Beam(tid, fname, lname, dept)

Takes_Beam(sid, cid, grade)

Teaches(tid, cid)

Does this query require a `HAVING` clause?

A. Yes
B. No

Database Views

- Return a table of results from a SQL query
- Saved in the database as named query
- Defined by `CREATE VIEW` statement

Employee(empid, fname, lname, job, level, start_date, curr_salary, dob, ssn, emergency_contact)

```
CREATE VIEW Manager_View AS
    SELECT empid, fname, lname, job, level, start_date, curr_salary
    FROM Employee
    WHERE level NOT IN ('Executive', 'CEO')
    ORDER BY empid
```

```
SELECT empid, fname, lname
FROM Manager_View
WHERE start_date < '2020-01-01'
AND job = 'Data Engineer'
```

Example Views

```
CREATE VIEW Executive_View AS
    SELECT empid, fname, lname, job, level, start_date, curr_salary
    FROM Employee
    WHERE level != 'CEO'
    ORDER BY empid
```

```
SELECT empid, fname, lname
FROM Executive_View
WHERE curr_salary > 300000
AND level = 'Director'
```

```
CREATE VIEW Manager_View AS
    SELECT empid, fname, lname, job, level, start_date, curr_salary
    FROM Executive_View
    WHERE level != 'Executive'
    ORDER BY empid
```

```
SELECT empid, fname, lname
FROM Manager_View
WHERE start_date < '2020-01-01'
AND role = 'Data Engineer'
```

Case Study: Coronavirus (COVID-19)

Jupyter Notebook:

- Walk through ingestion pipeline
- Walk through modeling pipeline
- Walk through analysis queries
- Create BQ views

Data Studio:

- Create data sources in Data Studio
- Connect data sources to BQ views
- Create charts and reports in Data Studio

Milestone 7

http://www.cs.utexas.edu/~scohen/milestones/Milestone7.pdf

Appendix: Additional Practice Problems

Fourth Question

For each student who is at least 19-years old and is earning more than 2 class credits, how many total class credits are such students earning?

Student(sid, fname, lname, dob)

Class(cno, cname, credits)

Teacher(tid, fname, lname, dept)

Takes(sid, cno, grade)

Teaches(tid, cno)

iClicker Question

For each student who is 19-years old or above and is earning at least 3 class credits, how many total class credits are such students earning?

Student(sid, fname, lname, dob)
Class(cno, cname, credits)
Teacher(tid, fname, lname, dept)
Takes(sid, cno, grade)
Teaches(tid, cno)

Does this query require a `WHERE` clause?

A. Yes B. No

Fifth Question

Who takes exactly 3 classes?

Show the answer as a sorted list of sids.

Student(<u>sid</u>, fname, lname, dob)

Class(<u>cno</u>, cname, credits)

Teacher(<u>tid</u>, fname, lname, dept)

Takes(<u>sid</u>, <u>cno</u>, grade)

Teaches(<u>tid</u>, <u>cno</u>)

iClicker Question

Who takes exactly 3 classes?

Show the answer as a sorted list of sids.

Student(sid, fname, lname, dob)
Class(cno, cname, credits)
Teacher(tid, fname, lname, dept)
Takes(sid, cno, grade)
Teaches(tid, cno)

Does this query contain an aggregate function in the `SELECT` clause?

A. Yes B. No